
University of California, Davis
Department of Political Science

Political Science 211
Research Methods I

Monday and Wednesday 10:00-11:20am
594 Kerr Hall

Fall 2014

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This is the first of three required courses in the Department of Political Science's political methodology sequence. This course is an introduction to probability theory and mathematical statistics. We will cover the basic concepts in statistics including probability, discrete and continuous probability distributions, random variables, moments, hypothesis testing, and inference. These topics form the foundation on which all statistical work is based. This foundation will be important for understanding the material in the other classes in the methods sequence, for understanding any advanced methods courses you take in the future, for making you more informed readers of political science research, and, importantly, for improving the statistical analysis you do in your own research. Note: I assume no prior mathematical skills beyond those covered in the Math Camp.

We will be using R, which is a statistical computing environment and high-level programming language, for simulation and sampling exercises that will provide some of the intuition into the theoretical treatment of the material. I assume no prior knowledge of R. R is open source and can be downloaded for free from the [Comprehensive R Archive Network \(CRAN\)](#) and is also installed on the computers in the grad lab. There are many R-related resources available on the web. Below are links to some useful R resources:

[R Programming Wikibook](#)

[An Introduction to R](#)

[R Reference Card](#)

Readings

There are two required books for this course:

Dennis D. Wackerly, William Mendenhall III, and Richard L. Scheaffer. 2008. *Mathematical Statistics with Applications*, 7th ed. Pacific Grove, CA: Duxbury. [WMS]

John Verzani. 2014. *Using R for Introductory Statistics*, 2nd ed. Boca Raton, FL: Chapman & Hall/CRC.

In addition, there are two recommended books:

Alan Agresti and Barbara Finlay. 2009. *Statistical Methods for the Social Sciences*, 4th ed. Upper Saddle River, NJ: Prentice Hall. [AF]

William J. Owen. 2008. *Student Solutions Manual for Mathematical Statistics with Applications*, 7th ed. Pacific Grove, CA: Duxbury. [Strongly recommended]

You will need both of the required books, as you will have problem sets from both of them. These required books and the student solutions manual are available in the campus bookstore, but they can be purchased online for a potentially lower price (try www.amazon.com, www.dealoz.com, or www.addall.com). NOTE: if you purchase the books online you should make sure that you get the editions noted above.

AF is a good undergraduate statistics book that can be used to supplement the WMS book, which is a theoretical treatment of the material. You may wish to purchase AF as a supplement to WMS and as an introduction to some elementary methods. This text is not available in the bookstore, but it can be purchased online.

The reading load for this course is fairly light (compared to your substantive courses). However, the work load is high. It is important to read carefully the relevant sections in the text before coming to class. Note: you should do the reading assigned for a given day **before** coming to class.

All lectures, problem sets, and supplementary material will be posted on SmartSite@UCDavis.

Evaluation

Your grade for this course will consist of 3 parts:

1. Exams (40%)

There will be two exams: a mid-term exam during the scheduled class time on November 5th and a final exam on December 15th from 10:00am-12:00pm. Both exams will be in-class and closed book. We will discuss together in class the format of the exams. Each exam will count as 20% of your final grade.

NOTE: Make-up exams will be given only in very extreme circumstances. Students needing to take a make-up exam must receive my approval well before the exam date. A missed exam is assigned a grade of 0. If you miss an exam due to an illness or death in the family, I will require written verification.

2. Problem Sets (50%)

There will be 10 problem sets in this course. Each of these problem sets will count as 5% of the course grade. You will generally have one week to complete each problem set.

Problem sets will be marked down the equivalent of a full letter grade for each 24 hour period in which they are late, starting at the beginning of class on the day on which they are due, whether or not you attend class. Additionally, no matter how many days have passed, problem sets will not be accepted for any amount of credit once the graded problem sets for the same assignment are returned. For example, problem sets due at 10:00am on Monday but turned in anytime after 10:00am Monday and before 10:00am on Tuesday will be marked down one letter grade. Those turned in between Tuesday at 10:00am and Wednesday at 10:00am will be marked down two letter grades. But assuming the graded problem sets are returned to the rest of the class Wednesday morning, after Wednesday at 10:00am no additional problem sets will be accepted, period. I will only make an exception to this policy if: 1) you contact me in writing at least 7 days in advance to discuss a conflict, or 2) you provide documentation of a severe illness or family emergency that prevented you from completing the problem set on time.

The problem sets will be a mix of analytic and computational problems. The analytic problems will be assigned from the textbook. The solutions are provided in the back of the book for some of the odd numbered problems. The student solutions manual provides answers to all of the odd numbered problems. To supplement the analytic problems, the computational problems will highlight the theoretical concepts in the context of both real and simulated data. You can either: 1) hand-write your answers (legibly please), 2) type your answers in Microsoft Word or any other WYSIWYG program (not the best idea), or 3) type your answers using \LaTeX . If you plan on having methods as one of your main fields, I strongly suggest that you learn \LaTeX and that you do so now. Good places to start are the [TeX Users Group](#), [Comprehensive TeX Archive Network](#), and [LaTeX Wiki](#). All problem sets should be submitted as hard (paper) copies.

Collaboration: You may collaborate with other students on your problem sets, and I encourage you to do so. However, I strongly suggest the following procedure to make the most of your time working through the problem sets: 1) try to solve *all* of the problems yourself, 2) get together with your colleagues to discuss the problems and their solutions, and 3) write up the solutions on your own. In other words, although I encourage collaboration, your submitted work must be your own. Each student must turn in their own solutions and computer code. Any duplicate submissions will be considered plagiarism. These cases will be handed over to the appropriate authorities for disciplinary action. Beyond the virtue of doing your own work, the exams will be far more pleasant if you have experience working through the problems on your own.

3. Class Participation (10%)

Class participation consists of attending class and participating in discussion. Both are vital to develop a full understanding of the material. I expect you to have read the assigned chapter prior to coming to the class for which it is assigned.

Since this is a graduate course, it need not be said that attendance is mandatory. And since this is a graduate methods course, talking in class is particularly crucial. Although the sometimes daunting nature of the material can sometimes make it intimidating to ask questions in class, asking your questions and getting the help you need is nothing short of critical for your success in this course. I can only address difficulties you may be having with the material if you bring them to my attention.

Class Schedule

The schedule below is tentative because it is hard to predict in advance which topics students will find difficult or easy. As a result, it is hard to predict exactly how much time we will spend on each topic.

Date	Topic
October 6 (M)	Probability I WMS: Ch. 2 (AF: Ch. 4.1-4.2) Ashworth, Scott, Joshua D. Clinton, Adam Meirowitz, and Kristopher W. Ramsey. 2008. "Design, Inference, and the Strategic Logic of Suicide Terrorism." <i>American Political Science Review</i> 102(2): 269-273. Pape, Robert A. 2008. "Methods and Findings in the Study of Suicide Terrorism." <i>American Political Science Review</i> 102(2): 275-277. Ashworth, Scott, Joshua D. Clinton, Adam Meirowitz, and Kristopher W. Ramsey. 2008. "Design, Inference, and the Strategic Logic of Suicide Terrorism: A Rejoinder." Radio Lab. 2009. Stochasticity. Radio Lab Podcast Radio Lab. 2009. Are We Coins? Radio Lab Podcast
October 8 (W)	Probability II
October 10 (F)	<i>Problem Session (optional)</i>
October 13 (M)	Discrete Random Variables and their Probability Distributions I WMS: Ch. 3 Verzani: Ch. 5 & 6 Problem Set 1 Due
October 15 (W)	Discrete Random Variables and their Probability Distributions II
October 17 (F)	<i>Problem Session (optional)</i>
October 20 (M)	Continuous Random Variables and their Probability Distributions I WMS: Ch. 4 Problem Set 2 Due

- October 22 (W) **Continuous Random Variables and their Probability Distributions II**
- October 24 (F) *Problem Session (optional)*
- October 27 (M) **Multivariate Probability Distributions I**
WMS: Ch. 5
Problem Set 3 Due
- October 29 (W) **Multivariate Probability Distributions II**
- October 31 (F) *Problem Session (optional)*
- November 3 (M) **Multivariate Probability Distributions III**
- November 5 (W) **MID-TERM EXAM**
- November 10 (M) **Sampling Distributions and the Central Limit Theorem**
WMS: Ch. 7 (AF: Ch. 4.3-4.7)
Problem Set 4 Due
- November 12 (W) **Estimation I**
WMS: Ch. 8 (AF: Ch. 5)
Verzani: Ch. 7
Problem Set 5 Due
- November 14 (F) *Problem Session (optional)*
- November 17 (M) **Estimation II**
- November 19 (W) **Estimation III**
- November 21 (F) *Problem Session (optional)*
- November 24 (M) **Properties of Point Estimators and Methods of Estimation I**
WMS: Ch. 9
Problem Set 6 Due
- November 26 (W) **Properties of Point Estimators and Methods of Estimation II**

- December 1 (M) **Hypothesis Testing**
- WMS: Ch. 10 (AF: Ch. 6)
Verzani: Ch. 8
- Problem Set 7 Due**
- December 3 (W) **Linear Models and Estimation by Least Squares**
- WMS: Ch. 11 (AF: Ch. 9)
Verzani: Ch 10.1-10.2
- Problem Set 8 Due**
- December 5 (F) *Problem Session (optional)*
- December 8 (M) **Examining Bivariate Data**
- Verzani: Ch. 3
- Problem Set 9 Due**
- December 10 (W) **Examining Multivariate Data**
- Verzani: Ch. 4
- Problem Set 10 Due**
- December 12 (F) *Problem Session (optional)*
- December 15 (M) **FINAL EXAM: 10:00am-12:00pm**